

**Amendments to the Claims:**

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An electrolytic phosphate chemical treatment method of forming a film composed of a phosphate compound and a metal that is reduced and precipitated from an ionic state on the surface of a metal material article to be treated, comprising:

performing the electrolytic phosphate chemical treatment on said metal material article in a phosphate chemical treatment bath by contacting said metal material article with said phosphate chemical treatment bath containing

phosphate ions,

phosphoric acid,

nitrate ions,

metal ions that form a complex with the phosphate ions and phosphoric acid in said phosphate chemical treatment bath, and

metal ions, wherein a dissolution-precipitation equilibrium potential at which the metal ions in said phosphate chemical treatment bath are reduced and precipitate as metal is equal to or greater than -830 mV, which is the cathodic reaction decomposition potential of water when indicated as a hydrogen standard electrode potential,

wherein

the electrolytic phosphate chemical treatment involves the application of voltage and current from an external power supply, and cathodic electrolysis is carried out using the metal material article for the cathode;

the phosphate chemical treatment bath has a pH of 2.5 or lower and is substantially free of metal ions, other than those which are a component of the film, which will form sludge;

Fe is present and an amount of Fe ions dissolved in the phosphate chemical treatment bath is controlled by changes in the amount of Fe ions dissolved into the phosphate chemical treatment bath from a Fe ion source, the Fe ion source being at least one of (1) an electrode when said electrode comprises ~~Fe-Fe~~, (2) a replenishing liquid containing Fe ions and ~~(2)-(3)~~ the metal material article to be treated when the metal article to be treated comprises a steel material, so that the phosphate chemical treatment bath does not contain  $\text{Fe}^{3+}$  ions in an amount of more than the solubility limit;

$\text{NO}_2$  and/or  $\text{N}_2\text{O}_4$  gas generated and dissolved in the phosphate chemical treatment bath during a reduction reaction of the nitrate ions of the electrolytic treatment is removed from the treatment bath by separating a treatment tank into an electrolytic treatment tank where the electrolytic treatment is carried out and an auxiliary tank where no electrolytic treatment is carried out, circulating the treatment bath between the two tanks, and providing a mechanism that opens the treatment bath to the atmosphere at a reduced pressure either between the two tanks or within the two tanks, as a means of separating the  $\text{NO}_2$  and/or  $\text{N}_2\text{O}_4$  gas from the treatment bath; and

the oxidation-reduction potential (ORP) of said phosphate chemical treatment bath, indicated as the potential relative to the hydrogen standard electrode potential, is maintained at 770 mV to 960 mV, and is used to monitor the phosphate chemical treatment bath.

2. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein said electrolytic treatment uses for an electrode material that dissolves in the phosphate chemical treatment bath the metal ions that form a complex with

the phosphoric acid and the phosphate ions in the phosphate chemical treatment bath, a metal material wherein a dissolution-precipitation equilibrium potential at which the metal ions in the phosphate chemical treatment bath from the metal material are reduced and precipitate as the metal is greater than or equal to -830 mV, or a metal material that is insoluble during the electrolytic treatment.

3. (Previously Presented) The electrolytic phosphate chemical treatment method according claim 1, wherein the amount of Fe ions dissolved into the phosphate chemical treatment bath provides that said ORP of the phosphate chemical treatment bath is 800 mV to 960 mV and maintains the amount of Fe ions within the solubility limit of  $\text{Fe}^{3+}$  ions.

4. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the amount of Fe ions dissolved into the phosphate chemical treatment bath provides that said ORP of the phosphate chemical treatment bath is 770 mV to 960 mV.

5. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, comprising a second electrode used in the electrolytic treatment for making the ORP of the phosphate chemical treatment bath 770 mV to 960 mV, and wherein said second electrode is an insoluble metal material.

6-7. (Canceled)

8. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the metal ions that form a complex with the phosphate ions and phosphoric acid in the phosphate chemical treatment bath are at least one of Zn, Fe, or Mn ions.

9. (Canceled)

10. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the auxiliary tank that does not carry out the electrolytic

treatment has a mechanism in which the treatment liquid is passed through a permeable solid structure.

11. (Original) The electrolytic phosphate chemical treatment method according to claim 10, wherein the solid structure is a film.

12. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein a filter having a mechanism that filters the treatment liquid is used for the auxiliary tank that does not carry out the electrolytic treatment.

13. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the circulating comprises removing, through a liquid circulation circuit, a portion of the treatment bath at a location prior to being introduced into a filter material in a filter, wherein the auxiliary tank includes the filter material of the filter and the removed portion of the treatment bath is fed to the filter material of the filter via the liquid circulation circuit, and wherein the removed portion of the treatment bath is returned to the electrolytic treatment tank after separating the  $\text{NO}_2$  and  $\text{N}_2\text{O}_4$  present in the removed portion of the treatment bath.

14. (Canceled)

15. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the treatment bath is maintained in a constant state by measuring an oxidation-reduction potential value of the treatment bath and changing an amount and/or composition of replenishing chemical corresponding to the change in that value.

16. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein the ORP of said phosphate chemical treatment bath is maintained at 800 mV to 960 mV.

17-18. (Canceled)

19. (Previously Presented) The electrolytic phosphate chemical treatment method according to claim 1, wherein when using the Fe electrode in the cathodic electrolysis, the cathodic electrolysis is controlled by controlling the amount of  $\text{Fe}^{2+}$  ions dissolved into the phosphate chemical treatment bath from said Fe electrode ( $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$ ) so that the phosphate chemical treatment bath does not contain  $\text{Fe}^{3+}$  ions more than the solubility limit when said  $\text{Fe}^{2+}$  ions are oxidized to  $\text{Fe}^{3+}$  ions ( $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}^-$ ).